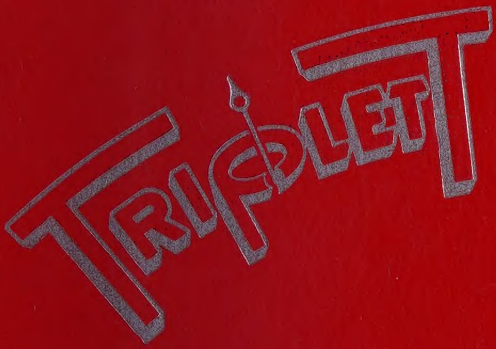
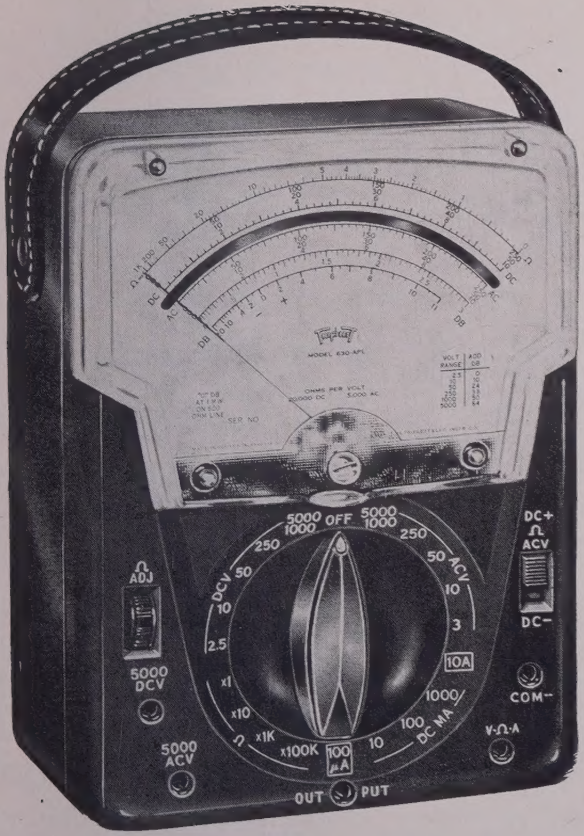


INSTRUCTION MANUAL

MODEL 630-APL

VOLT-OHM-MILLIAMMETER

MANUAL ONLY · $ .50



Model 630-APL
Volt-Ohm-Milliammeter

The Triplett Electrical Instrument Company
Bluffton, Ohio

FOREWORD

With your purchase of a Model 630-APL Volt-Ohm-Milliammeter, you have made a worthwhile investment, not only in a fine instrument, but backed by a company which has been making instruments for more than half a century. The Triplett Company stands behind your 630-APL and will give all possible assistance in its use and maintenance.

TRIPLETT WARRANTY AND CONDITIONS OF SALE

The Triplett Electrical Instrument Company warrants instruments manufactured by it to be free from defective material or factory workmanship and agrees to repair or replace such instruments which under normal use and service, disclose the defect to be the fault of our manufacturing. Our obligation under this warranty is limited to repairing or replacing any instrument or test equipment which proves to be defective, when returned to us transportation prepaid, within ninety (90) days from the date of original purchase.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons or service stations in any way so as, in our judgment, to injure their stability or reliability or which have been subject to misuse, negligence or accident or which have had the serial number altered, effaced, or removed. Neither does this warranty apply to any of our products which have been connected, installed, or adjusted otherwise than in accordance with the instructions furnished by us. Accessories including all vacuum tubes and batteries not of our manufacture used with this product are not covered by this warranty.

The Triplett Electrical Instrument Company reserves the right to discontinue models at any time, or change specifications or design, without notice and without incurring any obligation.

Upon acceptance of the material covered by this invoice the purchaser agrees to assume all liability for any damages and bodily injury which may result from the use or misuse of the material by the purchaser, his employees, or others, and that The Triplett Electrical Instrument Company shall incur no liability for direct or consequential damage of any kind.

Parts will be made available for a maximum period of five (5) years after the manufacture of this equipment has been discontinued. Parts include all materials, charts, instructions, diagrams, accessories, et cetera, which were furnished in the standard or special models.

This warranty and conditions of sale are in lieu of all others expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

The Triplett Electrical Instrument Company
Bluffton, Ohio

Printed in U.S.A. **Part No. 84-90-102563-14**

(For above Serial No. 21,672)

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The Model 630-APL Volt-Ohm-Milliammeter is a rugged long scale multi-range instrument in a compact portable case.

Remove the test leads from the small envelope and notice the two alligator clips enclosed. The clips slide over the ends of the test prods and make very handy connectors.

Plug the small ends of the test leads into the panel jacks marked COM and V-Ω-A. The jacks and plugs are especially made for trouble-free, low resistance connections.

Scales

Notice there are five scales on the meter. The top scale (red) is used when measuring ohms. This scale is marked from 0 to 1K (at left side). With the switch knob turned to Ω×1, the ohms scale is read just as it is marked. With the switch knob turned to Ω×10, the numbers on ohms scale must all be multiplied by 10. Likewise Ω×1K and Ω×100K mean to multiply by 1000 and 100,000 respectively.

The second scale from the top (black) is used to read all DC currents and voltages. The third from the top (red) is used for all AC voltages except the 3 volt range—the latter is read on the bottom red scale (marked 3 at full scale).

The lowest scale (black) is used for all decibel measurements. Notice the chart near the lower right hand corner of the dial. This is used in conjunction with the DB scale as explained on page 14.

Panel

Just below the meter is a small plastic screw. This is rotated with a small coin or screw driver to adjust the meter pointer to zero. This need be adjusted only occasionally but for best accuracy the pointer should always be on zero before making a measurement.

The large knob in the lower center of the panel is used to select all ranges. The markings are self explanatory.

Left of the knob is a recessed Ω ADJ control used when making resistance measurements.

To the right of the knob is a recessed switch used for reversing polarity on DC ranges.

Observe the jacks and note carefully the marking for

each. You will use the COM and V-Ω-A, jacks for most measurements. The polarity reversing switch must be in the "DC+, Ω, ACV" position for all ohm and ACV measurements.

PROTECTION: A one ampere fuse is incorporated in the ohm circuits for protecting the ohm circuit when it is accidentally placed across high voltage. A spare fuse is attached to unit inside the tester.
NOTE: This fuse is in series with ohmmeter circuit and is physically mounted on the back of the meter housing.
You are cautioned not to substitute the indicated 3AG Littlefuse for it can disturb the balance of the circuit and read in error.

Accuracy

Your 630-APL is accurate to within 1½% of full scale reading on all DC ranges except the 5000 volt range which is within 3%. AC ranges, except 5000 V, are accurate to within 3% when used at 77° F on 60 cycle sine wave voltages. The 5000 ACV range is accurate to within 3½%. The resistance ranges are accurate to within 1½% of the scale length. Precision non-aging resistors insure lasting accuracy. All units are calibrated at 77° F. AC ranges are calibrated on a 60 cycle sine wave. In choosing ranges always endeavor to have the readings fall in the upper (or right hand) half of the scale for greatest accuracy. Also for greatest accuracy, the instrument should be used in the horizontal position.

Ranges

The following ranges are self contained in your 630-APL:

DC Volts	2.5-10-50-250-1000-5000 at 20,000 Ohms per Volt/0-.250 at 10,000 Ohms per volt
AC Volts	0-3-10-50-250-1000-5000 at 5,000 Ohms per Volt
DC Microamperes	0-100 at 250 Mv.
DC Milliamperes	0-10-100-1000 at 250 Mv.
DC Amperes	0-10 at 250 Mv.
Ohms	0-1000-10,000.....(4.4-44 at center scale)
Megohms	0-1-100....(4400-440,000 at center scale)
Output Volts(AC)	0-3-10-50-250-1000 at 5,000 Ohms per Volt
Decibels	—20 to +11, 21, 35, 49, 61, 75 on 600 Ohm line

Your 630-APL is well constructed but like any instrument should be handled carefully. You will also want to keep the panel clean as cleanliness and carefulness go hand in hand.

Measuring DC Volts (Fig. 1)

Rotate the selector switch to the appropriate range for DC volts. Always start with the highest range if in doubt as to the approximate voltage.

In choosing ranges, endeavor to have the readings fall in the upper, or right hand, half of the scale for greatest accuracy.

Plug the black test lead into the COM jack and the red lead into the V-Ω-A jack as shown in Figure 1.

CAUTION: When measuring up to 5000 volts set the selector switch on the 5000/1000 range, plug the red lead into the jack marked 5000 DCV, and leave the black lead in COM.

Connect the test prods ACROSS the voltage source. The red lead is positive. Where polarity is difficult to determine, the meter may read backwards. No damage will be done if this occurs. Simply reverse the polarity switch.

The V-Ω-A jack will be positive when the polarity switch is in the "DC+" position.

Read all DC voltages on the top black meter scale. Notice that the scales are not all marked exactly the same as the range indicated by the knob position. Thus 0-2.5 volts is read on the 0-250 scale (i. e. ÷ by 100) on all readings, the 0-1000 range is read on the 0-10 scale by adding two zeros, and the 0-5000 range is read on the 0-50 scale by adding two zeros.

The high sensitivity of 20,000 ohms per volt will allow you to take measurements in low current circuits such as grid and discriminator circuits.

Voltages as low as .005 volts, (.250 volts full scale at 10,000 ohms per volt) may be read by using 100 uA DC current range. Simply place the range selector in the 100 uA position and read the voltage on the 0-250 scale (divide by 1000 for volts).

CAUTION: For maximum safety do not handle tester or leads when connected to high voltages. Make certain that no condensers are charged to a high voltage.

NOTE: To measure above 1000 volts, the red lead must be plugged into the 5000 DCV jack and selector switch set on the 5000/1000 DCV range.

For handy operation chart see pages 16 and 17.

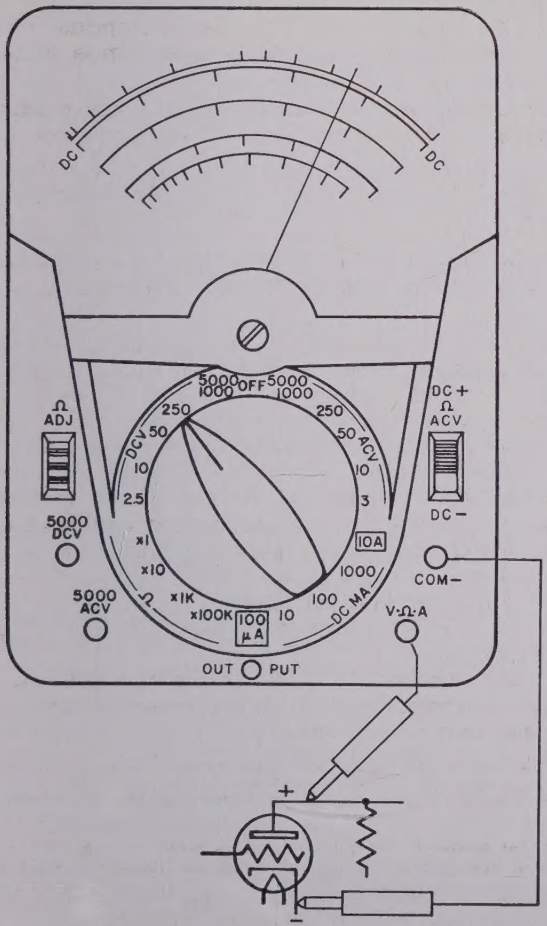


Figure 1—Measuring DC Volts

Measuring AC Volts (Fig. 2)

Rotate the Selector switch to the appropriate range for AC volts and set the polarity switch to ACV. Always start with the highest range if in doubt as to the approximate voltage.

In choosing ranges, endeavor to have the readings fall in the upper, or right hand, half of the scale for greatest accuracy.

Plug the black test lead into the COM jack and the red lead into the V-Ω-A jack as shown in Figure 2.

CAUTION: When measuring up to 5000 volts set the selector switch on the 5000/1000 range, plug the red lead into the jack marked 5000 ACV, and leave the black lead in COM.

Connect the test prods ACROSS the voltage source. As there is no polarity on AC, the red and black leads may be interchanged without causing the meter to read backwards.

Use the two lower red scales for AC volt readings. Note that the bottom scale is to be used ONLY for one range, namely the 0-3.

When using the 0-1000 AC volt range, read on the 0-10 scale by adding two zeros. When on the 5000 volt range use the 0-50 scale by adding two zeros.

With the special design of the two diodes in a modified full wave bridge circuit, the 630-APL gives a wide frequency response usable from 10 c p s to 500 Kc.

CAUTION: For maximum safety do not handle tester or leads when connected to high voltages.

NOTE: To measure above 1000 volts, red lead must be plugged into the 5000 ACV jack and the selector switch set on the 5000/1000 ACV range.

For handy operation chart see pages 16 and 17.

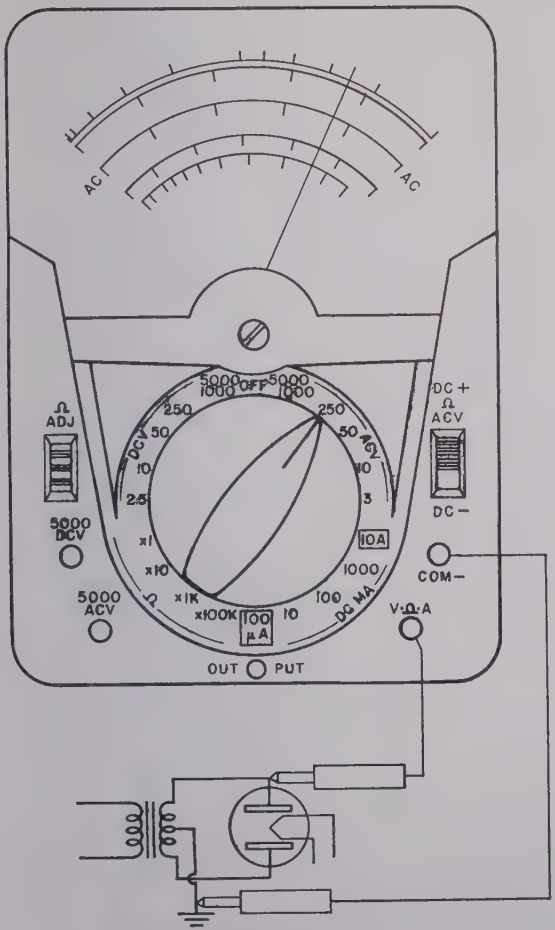


Figure 2—Measuring AC Volts

Measuring DC Resistance (Fig. 3)

Rotate the selector switch to the appropriate range for ohms determined from the following chart:

To Read	Set Switch to
0-1000 ohms	Ω×1
0-10,000	Ω×10
0-1 Meg.	Ω×1K
0-100 Meg.	Ω×100K

Set the polarity switch to Ω.

Plug the black test lead into the COM jack and the red lead into the V-Ω-A jack as shown in Figure 3.

Short the test prods together and adjust the Ω ADJ knob until the meter pointer reads 0 on the top red (Ω) scale. (The 0 for the ohms scale is at the extreme right side of the scale.)

Connect the test prods across the resistor as shown. If the resistor is wired in a circuit, disconnect one end of the resistor before taking the reading.

Each time an ohm range is changed, it is well to check the 0 setting as outlined in paragraph 4 above.

The basic scale 0-1K (0-1000) is used for reading on all ohm ranges. Simply multiply the scale numbers by 1, 10, 1000, or 100,000 as indicated by the selector switch setting.

It should be kept in mind that in the measurement of resistance a current is passed through the unknown resistor. Generally this current is so small as to be negligible. However on the 0-1000 range fairly high current is employed.

CAUTION: On X1 ohm position reading approximately center scale (4.4 ohms) the current drain from the 1.5 volt battery is 170 MA. It is desirable to make a practice of using one of the higher ohm ranges for general continuity or circuit testing. This will give you much longer battery life.

NOTE: In the ohms circuit the battery polarity at the leads is as indicated. The red lead is positive.

Since the scale of an ohmmeter is non-linear, the accuracy of the reading cannot be expressed as a per cent of full scale. Ohmmeter accuracy is generally referred to as a linear scale such as the DC volt scale. Thus $\pm 1\frac{1}{2}\%$ ohmmeter accuracy means an allowable $\pm\frac{3}{4}$ divisions on the DC scale. For example 2 ohms could read from about 1.85 to 2.2 ohms and be within tolerance.

NOTE: Do not touch any metal parts of the circuit when using the high ohm ranges. It is not dangerous but your body resistance can cause serious error.

For handy operation chart see pages 16 and 17.

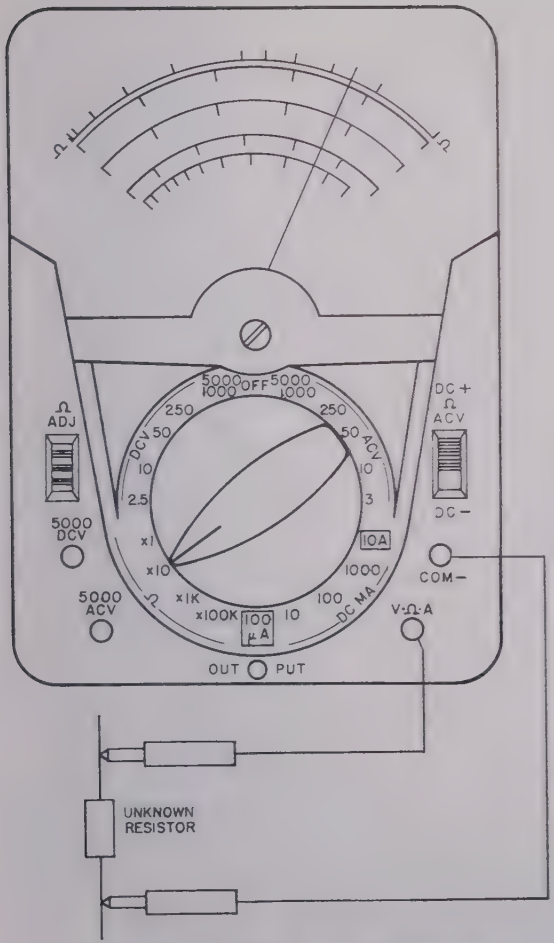


Figure 3—Measuring DC Resistance

Measuring DC Current (Fig. 4)

Rotate the selector switch to the appropriate range for DC current. Always start with the highest range if in doubt as to the approximate current.

In choosing ranges, endeavor to have the readings fall in the upper, or right hand, half of the scale for greatest accuracy.

Plug the black test lead into the COM jack and the red lead into the V-Ω-A jack as shown in Figure 4.

Connect the test prods in SERIES with the circuit to be measured. Do not test directly across any potential circuits as this may burn out the instrument and shunt. The red lead is positive. Where polarity is difficult to determine, the meter may read backwards. No damage will be done if this occurs. Simply reverse the polarity switch.

Read all current ranges (including microamperes, milliamperes, and amperes) on the upper black scale. When on the 10 Ma. range use the 0-10 scale and read direct. On the 100 Ma. range again use the 0-10 scale by adding one zero.

CAUTION: Turn off the power before connecting the meter to the circuit. Do not handle tester or leads in high voltage circuits.

In using the 100 microampere range, the meter may read differently than calculations would indicate. This is sometimes caused in low current circuits by a slight leakage of voltage due to moisture. Other times a slight potential is generated by soldering or joining of dissimilar metals. Even the proximity of fumes or liquid acids and alkalies may react with the metal parts of the circuit and generate slight currents. The fingers should not be permitted to touch the metal parts of the prods or circuit as body resistance can also upset some circuits.

For handy operation chart see pages 16 and 17.

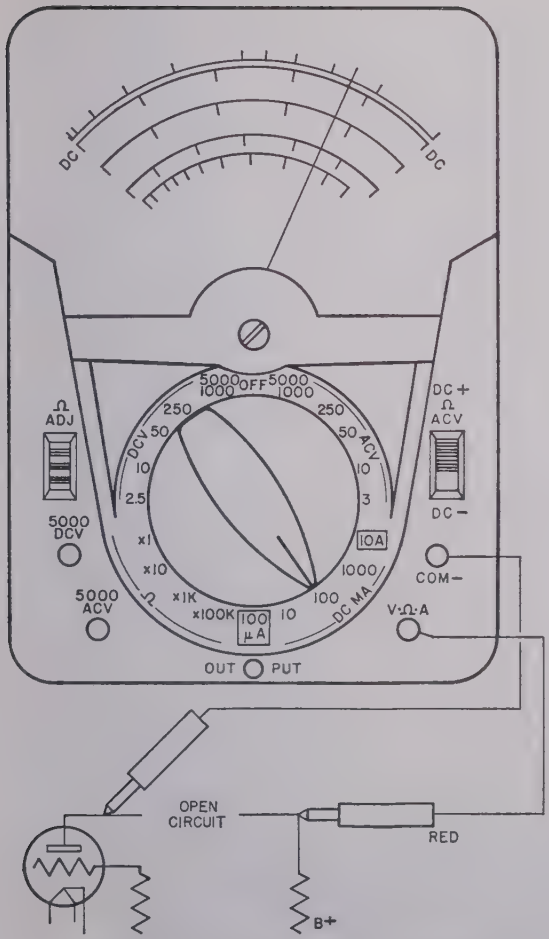


Figure 4—Measuring DC Current

Measuring Output Volts (DB) (Fig. 5)

Output is generally measured in units called the decibel, a terminology used to indicate power levels in amplifiers or telephone work.

Do not confuse the DB with the VU (Volume Unit). The VU is based on .001 watt dissipated in a 600 ohm line and is measured with a meter having special ballistic characteristics.

Rotate the selector switch to the appropriate AC volt range and set the polarity switch to ACV. Refer to the small chart on the meter dial for the range to use. Always start with the highest range if in doubt as to the approximate number of decibels.

Normally it is recommended to measure output by plugging the black lead into the COM jack and the red lead into the OUTPUT jack as shown in Figure 5.

Oftentimes a DC voltage is present in the circuit where output is to be measured. The extra jack marked OUTPUT with a .1 mfd condenser in series is provided to block the DC.

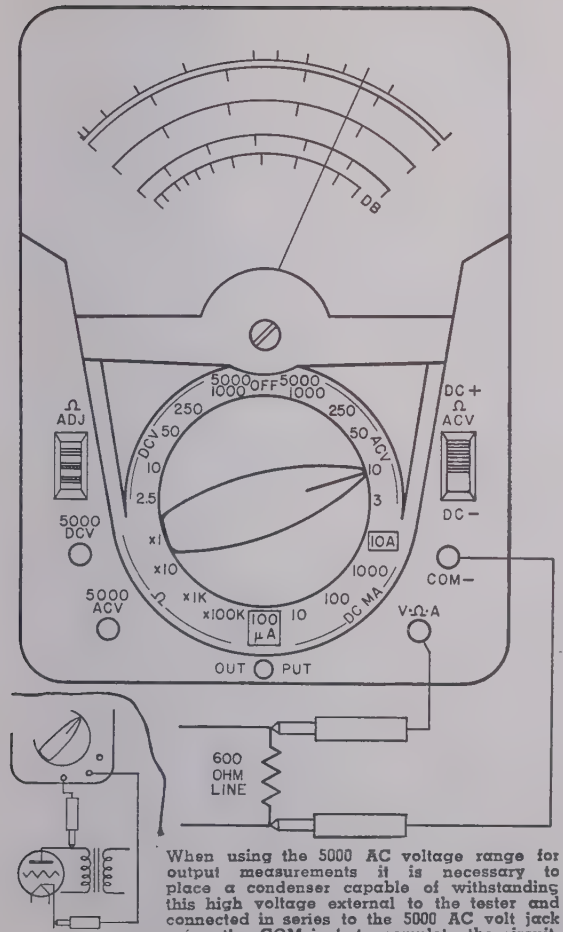
The condenser impedance is generally disregarded in most measurements. Where no DC is present, this output voltage can be read accurately by using the 630-APL as a regular AC voltmeter (i. e. by plugging the red lead into the V-Ω-A jack instead of OUTPUT.)

Connect the test prods across the plate circuit or speaker voice coil.

Read all DB ranges on the bottom black scale using the small chart on the meter dial. For example, when the selector switch is set on the 3 AC volt range, the DB scale is direct reading. When on the 10 AC volt range, add 10 to reading on the DB scale, thus with the meter reading —2, the approximate DB reading is +8 DB.

For a reference level of .006 watt in 500 ohms, subtract (+)7 DB from the reading to obtain the absolute value of decibels.

For handy operation chart see pages 16 and 17.



When using the 5000 AC voltage range for output measurements it is necessary to place a condenser capable of withstanding this high voltage external to the tester and connected in series to the 5000 AC volt jack using the COM jack to complete the circuit. This external condenser is not a furnished part of the equipment.

Figure 5—Measuring Output Volts (DB)

To Measure	Set Switch To Selector		Polarity	Plug R In J
DC VOLTS				
0-.250	100	μA	either	V–
0–2.5	2.5	DCV	either	V–
0–10	10	DCV	either	V–
0–50	50	DCV	either	V–
0-250	250	DCV	either	V–
0–1000	1000/5000	DCV	either	V–
0–5000	1000/5000	DCV	either	500
AC VOLTS				
0–3	3	ACV	ACV	V–
0–10	10	ACV	ACV	V–
0–50	50	ACV	ACV	V–
0–250	250	ACV	ACV	V–
0–1000	1000/5000	ACV	ACV	V–
0–5000	1000/5000	ACV	ACV	500
DC CURRENT				
0–100 Ua DC	100	μa	either	V–
0–10 Ma DC	10	DCMA	either	V–
0–100 Ma DC	100	DCMA	either	V–
0–1000 Ma DC	1000	DCMA	either	V–
0-10 AMPS DC	10	AMP	either	V–
OHMS				
0–1000	Ω×1		Ω	V–
0–10,000	Ω×10		Ω	V–
0–1 Meg	Ω×1K		Ω	V–
0–100 Meg	Ω×100K		Ω	V–
DECIBELS				
—20 to +11	3	ACV	ACV	Ou
—10 to +21	10	ACV	ACV	Ou
+ 4 to +35	50	ACV	ACV	Ou
+18 to +49	250	ACV	ACV	Ou
+30 to +61	1000/5000	ACV	ACV	Ou
+44 to +75	1000/5000	ACV	ACV	500

Test Lead Marked	Read On		Each Scale Div. Equals	
	BLACK SCALE			
	0–250	DC÷1000	0.005	Volt
	0–250	DC÷100	0.05	Volt
	0–10	DC×1	0.2	Volt
	0–50	DC×1	1.0	Volt
	0–250	DC×1	5.0	Volts
	0–10	DC×100	20.0	Volts
CV	0–50	DC×100	100.0	Volts
	RED SCALE			
	0-3V	AC×1	0.05	Volt
	0–10	AC×1	0.2	Volt
	0–50	AC×1	1.0	Volt
	0–250	AC×1	5.0	Volts
	0–10	AC×100	20.0	Volts
ACV	0–50	AC×100	100.00	Volts
	BLACK SCALE			
	0–10	DC×10	2.0	μa
	0–10	DC×1	0.2	Ma
	0–10	DC×10	2.0	Ma
	0–10	DC×100	20.0	Ma
	0–10	DC×1	0.2	Amp

Each Scale Division Equals (in ohms)

RED SCALE	0-4	4-5	5-10	10-20	20-50	50-200
Ω×1	.1	.2	.5	1	5	50
Ω×10	1	2	5	10	50	500
Ω×1K	100	200	500	1K	5K	50K
Ω×100K	10K	20K	50K	100K	500K	5 Meg

	BLACK SCALE
t	DB plus 0
t	DB plus 10
t	DB plus 24
t	DB plus 38
t	DB plus 50
ACV	DB plus 64

*** Black test lead plugged in "COM" jack for all measurements**

Measuring Capacity (Fig. 6)

Your 630-APL can be used to measure capacity by the arrangement shown in Figure 6. It is set up as an AC voltmeter. See page 8.

Use the following chart to determine the AC voltage range to use. ALWAYS start with the selector switch on the 250 volt range since, if the condenser is shorted, serious damage may result to the meter when on a low range.

To Measure MFD	Set Selector Switch to	Deflection in AC Volts
.002	3 ACV	.45
.004		.83
.006		1.25
.008		1.65
.010		2.10

CAUTION: Do not attempt to use this test on electrolytic condensers.

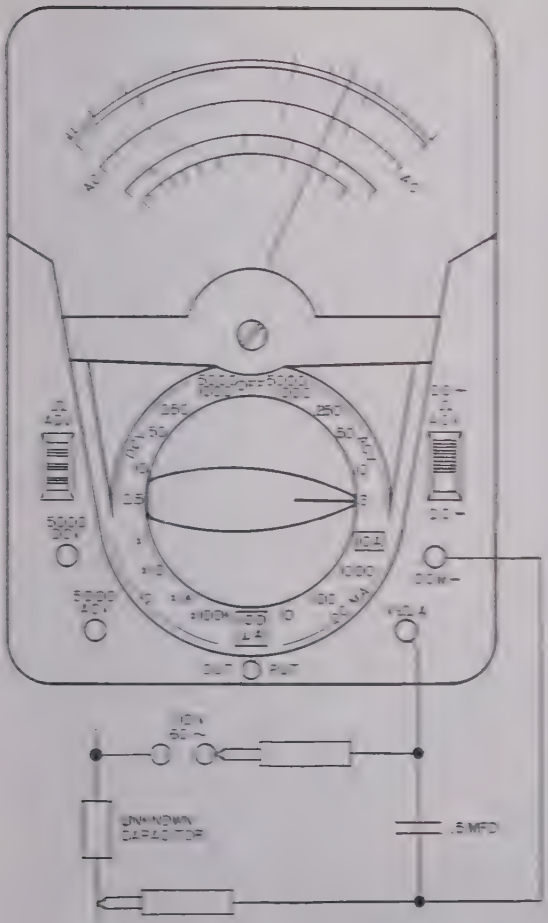


Figure 6—Measuring Capacity

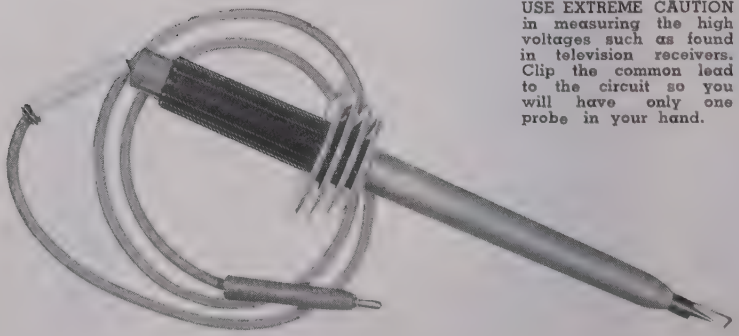
Measuring Kilovolts

For measuring the high voltage employed in television receivers and in other applications, an external probe is available. See Figure 7. Probes for DC are made in three ranges 0-10,000, 0-25,000, and 0-50,000 volts. Probes for AC are also available in the lower ranges.

To use the Kilovolt probe set range selector switch on 2.5 volt DC position if the DC probe is to be used. When the AC probe is used set range selector switch on 3 Volt AC position and set the polarity switch to ACV. Plug the Kilovolt probe lead into the V-Ω-A jack on bottom right corner of the front panel. Use the black standard lead for negative or common lead with it connected in the COM jack located on the lower right side of front panel.

Kilovolt Probe	Set Selector Switch	Read on Range	Multiply by
0-10KV DC	2.5V DC	0-10V DC	1000
0-25KV DC	2.5V DC	0-250V DC	100
0-50KV DC	2.5V DC	0-50V DC	1000
0-10KV AC	3V AC	0-10V AC	1000
0-25KV AC	3V AC	0-250V AC	100

Figure 7



USE EXTREME CAUTION in measuring the high voltages such as found in television receivers. Clip the common lead to the circuit so you will have only one probe in your hand.

Measuring High DC Current

External plug-in shunts are available to extend the DC current ranges of your 630-APL from the self-contained 0-10 to 0-25 amps. External portable shunts up to 100 amperes are also available. See paragraph on accessories.

Set the 630-APL selector switch to the 10 Ma position and plug the desired external shunt into the COM and V-Ω-A jacks. Connect the line to be measured to the binding posts on top of the shunts. The external portable shunts are too large to plug into the panel and must be connected to the panel jacks by the leads furnished with the shunts.

Accessories

The following accessories for your 630-APL are available from your distributor.

Item	Part No.
DC Hi-Voltage probe 0-10 Kv	T-79-83
AC Hi-Voltage probe 0-10 Kv	79-165
DC Hi-Voltage probe 0-25 Kv	T-79-130
AC Hi-Voltage probe 0-25-Kv	79-166
DC Hi-Voltage probe 0-50 Kv	T-79-92
Carrying cases 639, 639-N and 639-P	
Plug-in external shunt 0-25 DC Amp.	T-91-243
Portable external shunt 0-50 DC Amp.	T-91-244
Portable external shunt 0-100 DC Amp.	T-91-191
Clamp-on Ammeter Adapter, Model 10 (Ranges 6 to 300 AC Amps)	60A-211
Lead Assembly, No. 611 (Used in conjunction with Model 10)	79A-160
Line Separator, Model 101 (Used in conjunction with Model 10)	60A-218

In The Home

When your refrigerator motor fails to "kick out" the starting winding, use the 630-APL to measure the AC line voltage. If the voltage is below about 100 volts, notify your power company.

If your electric stove does not seem to heat quickly enough, measure the voltage input to the stove with all burners turned on and again with all burners turned off. If the difference between these two voltages is 10 or 15 volts, the power cable to the stove has defective connections or is not of large enough current carrying capacity.

Blown fuses sometimes do not visibly indicate they are burned out. With your 630-APL measure the voltage ahead and behind the fuse. Voltage ahead of the fuse but no voltage following indicates a blown, defective, or loose fuse. Sometimes it is easier to remove the fuse and measure its resistance. This should be substantially zero.

Your 630-APL is handy for locating trouble in desk and floor lamps. Pull the plug from the wall socket and check for a faulty cord, plug, switch, socket, or bulb by measuring resistance on the $\Omega \times 1$ range. 100 watt 120 volt bulbs should read 10 to 20 ohms. 50 watt 120 volt bulbs should read 20 to 40 ohms.

For the Radio Man

In addition to all common voltage, current, and resistance measurements used in servicing radios, the high sensitivity of your 630-APL is well adapted to measuring AFC, AVC, bias, and FM discriminator voltages.

Measurements of the high voltage up to 27,000 volts D. C. used in some television receivers for the picture tube can be effected with the special high voltage probe shown on page 20.

Considerable trouble is had with leakage in automobile radio antennas (due to moisture). Your 630-APL with the high ohm range 0-100 meg. is ideal to check this leakage. Disconnect the antenna from the receiver before making this check.

High frequency measurements are possible since the

630-APL has a wide frequency response—usable from 10 cps to 500 Kc.

In The Industrial Plant

Your 630-APL will be a big help in checking voltage drop caused by adding that extra machine on the already overloaded line. Correcting this will often save time later when a rush comes and the line "just happens" to burn up.

Measure the voltage at the machine first with the machine turned off and again with the machine in operation. If the voltage is proper with the machine off but low with the machine in operation, the circuit wiring or transformers have too small a capacity. If the voltage is low even with the machine off, the circuit is probably already overloaded and the machine should be wired into another circuit.

Equipment using automatic electric controls can be checked with the 630-APL. Faulty relay or control action is often caused by low voltage applied to the relay or control. This low voltage in turn, may be caused by burned or dirty contacts on the control device. Use the $\Omega \times 1$ range to check for high or unstable contact resistance.

When a phone on your dial telephone system fails, measure the line current and the voltage to the particular relay in question. If the voltage is proper, measure the contact resistance of the relay contacts using the $\Omega \times 1$ scale on your 630-APL. If this resistance is over a fraction of an ohm or if the resistance seems to waver, clean and adjust the relay contacts.

In The Garage

Fuses in the automobiles have a tendency to look perfectly good and yet not function due to corrosion under the metal end cap. Measure voltage ahead and behind the fuse to determine a defective unit. Or remove the fuse and measure its resistance. Anything over a fraction of an ohm is too high.

Checking automobile wiring, light switches, heaters, radios, etc., can be speeded up by simple use of your 630-APL.

In The Laboratory

Your 630-APL is built with all precision, non-aging resistors. The specially designed switch and special banana type plugs insure lasting accuracy. The meter with specially finished and selected pivots and jewels and a well designed stable magnet further makes the 630-APL a must for the laboratory.

Special Applications

The unusually high range ohmmeter in your 630-APL permits some indication of condenser leakage resistance. Measure as a resistor, see page 10, using the highest range. A good paper or mica condenser under 1 mfd. will indicate at the 100 Meg mark or above. If a steady reading (taken after the initial surge required to charge the condenser) of less than 100 megohms is obtained, the condenser probably has defective insulation. Good paper condensers over 1 mfd. may read somewhat less than 100 megohms. Electrolytic condensers should read above .1 megohm. In checking electrolytic condensers, the black test lead ("com" jack) should be connected to the positive terminal of the condenser.

Checks of insulation resistance for motors, generators, telephone cables, power cables, etc., can be made on the high ohmmeter range of your 630-APL. The actual value of resistance may vary from a few megohms to over 100 meg, depending on weather conditions and quality of insulation. The best method, therefore, is to make periodic checks on important cables or equipment and observe the trend in readings. As the readings tend to be lower and lower, it is time to start drying out the equipment or determine the cause of deterioration. Dirt, mice, or foreign matter can sometimes cause excessive leakage.

Battery Replacement

Two batteries are used for the ohmmeter circuits, a 1.5 volt Eveready No. 950 or equivalent and a 30 volt Eveready No. 413 or equivalent.

When the meter pointer can no longer be adjusted to zero (see page 10) ohms on the $\Omega\times1$, $\Omega\times10$, or $\Omega\times1000$ ranges, replace the 1.5 volt battery.

When the meter pointer can no longer be adjusted to zero ohms on the $\Omega\times100{,}000$ range, replace the 30 volt battery.

To replace batteries, remove the four screws in the bottom of the case and lift panel from the case. Simply remove the old, and replace with a new battery being careful to observe polarity.

Care

A little precaution in handling and caring for your 630-APL can pay big dividends in satisfaction. Treat your tester like you would a fine watch.

Avoid placing your tester on a bench where machine tools are used or severe vibration is encountered.

Do not place your 630-APL near the edge of a shelf or bench where it can easily be knocked off.

When possible keep your 630-APL in a place of moderate temperatures. Avoid places with extreme temperatures or severe temperature changes.

In use, don't take chances on overloading the meter. If in doubt as to the approximate reading always start with the highest range.

Get in the habit of double checking the position of the switch before making a measurement. The meter can be burned out by applying voltage when the switch is set on the current or ohms scale.

If the unit has not been in use for a long period of time, rotating the switch in both directions several times will wipe the contacts clean for good contact.

Turn the selector switch to OFF when the unit is to be carried. The meter is damped in this position to prevent wild swinging of the pointer.

PARTS LOCATION

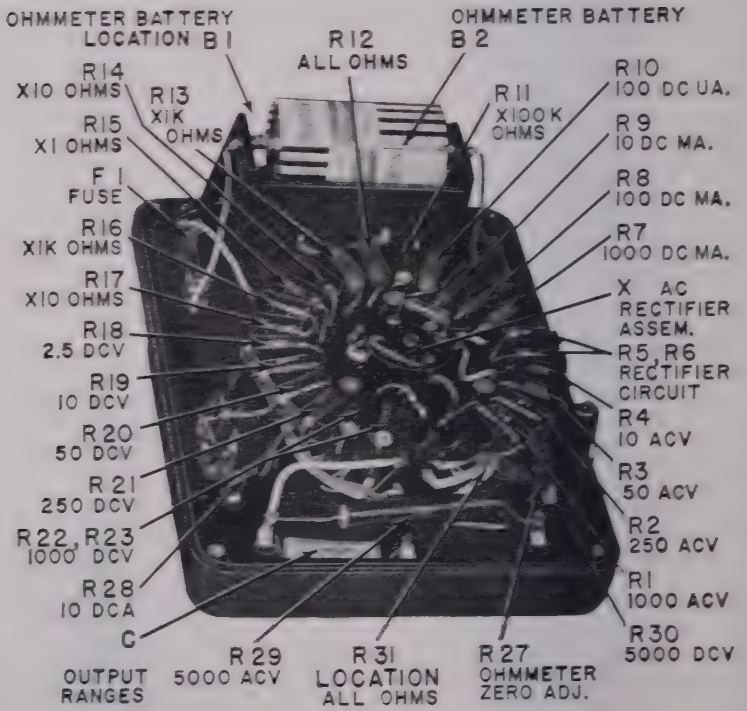


Figure 7

Ref. No.	DESCRIPTION	Part No. Req.
R1	Resistor 3.75 Meg., ±½%, ½W, film type	15-2858
R2	Resistor 1 Meg., ±½%, ½W, film type	15-2859
R3	Resistor 200K, ±½%, ½W, film type	15-2860
R4	Resistor 35K, ±½%, ½W, film type	15-2861
R5, R6	Resistor 5K, ±1%, ½W, film type	T-15-1009
R7	Resistor .25 ohms, ±½%, Wire type	15-2868
R8	Resistor 2.5 ohms, ±½%, Wire type	15-2869
R9	Resistor 25.12 ohms, ±½%, Wire type	15-2870
R10	Resistor 5K, ±½%, ½W, film type	T-15-1550
R11	Resistor 423K, ±½%, ½W, film type	15-4120
R12	Resistor 13.6K ±1%, ½W, film type	T-15-1758
R13	Resistor 4690, ±½%, ½W, film type	15-4118
R14	Resistor 37.2 ±½%, Wire type	15-4116
R15	Resistor 3.7 ohms, ±¼%, Wire type	T-15-3224
R16	Resistor 732, ±½%, ½W, film type	15-4119
R17	Resistor 6.5 ohms, ±½%, Wire type	15-4117
R18	Resistor 45K, ±½%, ½W, film type	T-15-1551
R19	Resistor 150K, ±½%, ½W, film type	15-2864
R20	Resistor 800K, ±½%, ½W, film type	15-2865
R21	Resistor 4 Meg., ±½%, ½W, film type	15-2866
R22, R23	Resistor 7.5 Meg., ±½%, ½W, film type	15-2867
R27	Resistor 20K, ±20%, Variable (with mtg. nuts & knob)	16-31
R28	Shunt assembly 10 Amp	90A-449
R29	Resistor 20 Meg., ±1%, 2W	15-1674
R30	Resistor 60 Meg., ±1%, 2W	15-2844
R31	Resistor 5100, ±5%, ½W	15-1411
C	Capacitor .1 MFD, 400WV, Sprague 68P21	T-43-69
B2	Battery 1.5V, Burgess No. 2 or NEDA No. 13	Available Locally
B1	Battery 30V, Burgess, U20E, Eveready 413 or NEDA No. 210	Available Locally
M	Meter 50 Micro-Amps, 250 Millivolts	52-1294
X	Rectifier assembly	2250A-30
S1	Switch 20 pos., 3 Deck without resistors	22A-319
	Switch 20 pos., 3 Deck with resistors	22-321
S2	Switch Slide DPDT (Wirt SW726)	T-22-152
	Knob Scarlet, 2 5/16 long with clip	34B-62
	Case with handle	T-10-784
	Jack contact	8944
	Clip shunt retaining No. C2416-012-27	T-2451-6
	Bumper rubber	T-3236-10
	Leads Banana Type	T-79-127
	Front Clear plastic with zero adj.	T-10-1225
F1	Fuse 1 Amp Littlefuse 3AG 3212001	3207-15

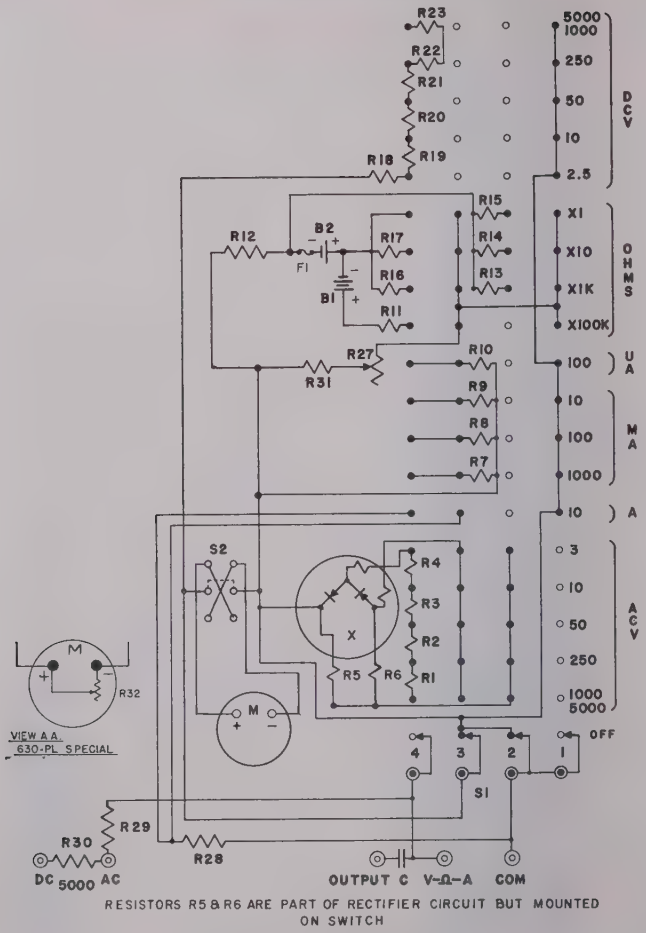


Figure 8—Circuit Diagram

DB CHART

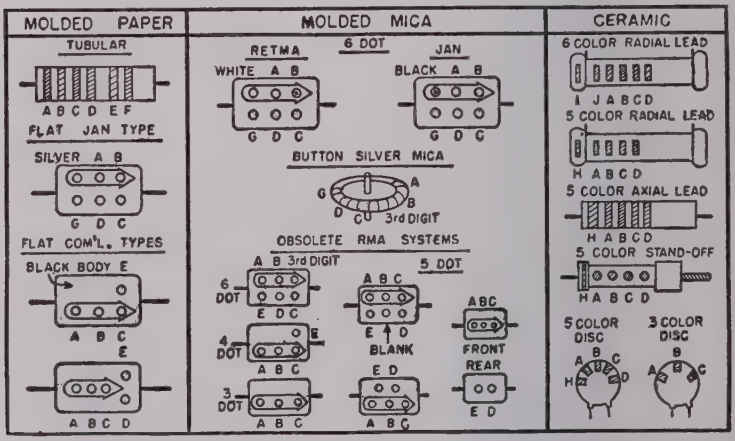
0 DB at 1 Mw Decibels with 600 ohm line	Line Power Mw	RMS Volts with line Imped. of 600 ohms
—20	.01	.0775
—10	.1	.245
—5	.316	.436
0	1.00	.775
+10	10.0	2.45
+15	31.6	4.36
+20	100	7.75
+30	1000	24.5
+40	10,000	77.5
+50	100,000	245.
+60	1,000,000	775.
+70	10,000,000	2450

Note:

The range of audibility can be considered to lie from 70 db below the normal speech level to 70 db above the same level, or a total range of 140 db.

EIA MICA CONDENSER COLOR CODE

Color	MOLDED PAPER Multiplier	Tolerance	MOLDED MICA Multiplier	Tolerance	CERAMIC Multiplier	Tolerance
Black	1	20%	1	20%	1	20% or 2.0$\mu\mu$fd.*
Brown	10		10		10	1%
Red	100		100	20% EIA	100	2%
Orange	1000		1000	3% EIA	1000	2.5% EIA
Yellow	10,000	5%	10,000		10,000	
Green				5% EIA		5% or 0.5$\mu\mu$fd.*
Blue						
Violet						
Gray					0.01	0.25$\mu\mu$fd.*
White		10%			0.1	10% or 1.0$\mu\mu$fd.*
Gold	0.1	5%	0.1			
Silver		10%	0.01	5% (JAN) 10%		* Capacitance less than 10$\mu\mu$fd.
None		20%				



(Courtesy Popular Electronics)

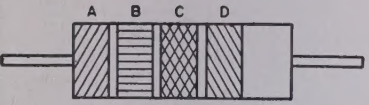
Capacitance is given in $\mu\mu$fd.

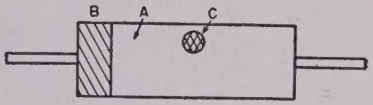
Colors—Same value as on resistors except as indicated in tables.

COLORS	INDICATES
A	First digit
B	Second digit
C	Multiplier
D	Tolerance
E & F	Voltage Rating in hundreds of volts

[(E) Ratings less than 1000 volts. (E) & (F) First two digits of ratings 1000 volts or more. Values of colors for (E) & (F) are same as in resistance values. (G) is class or characteristics of capacitor. (H), (I) & (J) give temperature coefficient. (G), (H), (I) & (J) are not listed in the tables.]

EIA RESISTOR COLOR CODE





COLOR	INDICATES
A	First number
B	Second number
C	Number of zeros
D	Tolerance

Color	Number	Color	Number
Black	0	Violet	7
Brown	1	Gray	8
Red	2	White	9
Orange	3	Gold	5% tolerance
Yellow	4	Silver	10% tolerance
Green	5	None	20% tolerance
Blue	6		

The resulting value is in ohms.

Example:

A 250,000 ohm 20% resistor.

A red
B green
C yellow
D no color

EIA SPEAKER COLOR CODE

Voice—Coil:
Green—finish
Black—start

Field Coils:
Black and red—start
Yellow and red—finish
Slate and red—tap (if any)

EIA WIRING COLOR CODE

B+	Red
Ground	Black
Plate	Blue
Grid	Green
Cathode	Yellow
High Heater	Brown
Low Heater	Black
Screen Grid	Orange
AVC	White

EIA TRANSFORMER COLOR CODE

I. F. Transformers:

Blue—plate lead
Red—"B" + lead
Green—grid (or diode) lead
Black—grid (or diode) return

NOTE: If the secondary of the i. f. t. is center-tapped, the second diode plate lead is green-and-black striped, and black is used for the center-tap lead.

Power Transformers:

1. Primary Leads ....Black
   If tapped:
   Common .....Black
   Tap—Black and Yellow Striped
   Finish—Black and Red Striped
2. High-Voltage Plate Winding .....Red
   Center-Tap — Red and Yellow Striped
3. Rectifier Fil. Winding... Yellow
   Center-Tap—Yellow and Blue Striped
4. Fil. Winding No.1. Green
   Center-Tap — Green and Yellow Striped
5. Fil. Winding No. 2. Brown
   Center-Tap — Brown and Yellow Striped
6. Fil. Winding No. 3. Slate
   Center-Tap — Slate are Yellow Striped

A. F. Transformers:

Blue—plate (finish) lead of primary

Red—"B" + lead (this applies whether the primary is plain or center-tapped).

Brown—plate (start) lead on center tapped primaries (Blue may be used for this lead if polarity is not important.)

Green—grid (finish) lead to secondary

Black—grid return (this applies whether the secondary is plain or center-tapped.)

Yellow—grid (start) lead on center tapped secondaries. (Green may be used for this lead if polarity is not important.)

Note: These marking apply also to line-to-grid, and tube-to-line transformers.

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